SWRHL-6r

FINAL REPORT OF OFF-SITE SURVEILLANCE FOR PROJECT LONGSHOT

by the
Southwestern Radiological Health Laboratory

Department of Health, Education, and Welfare
Public Health Service
National Center for Radiological Health

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INTRODUCTION

Project Longshot was an underground nuclear experiment conducted on Amchitka Island in the Aleutian Island Chain, on October 29, 1965 at 1100 hours AST.

Part of the Vela Uniform series, Project Longshot was designed to gather additional information on seismic waves generated by an underground nuclear detonation.

Under a Memorandum of Understanding between the U. S. Atomic Energy Commission (AEC) and the U. S. Public Health Service (PHS) the PHS conducted a program of radiological monitoring and environmental sampling along the Aleutian Island Chain, and at selected locations on the Alaskan mainland.

I. OPERATIONAL PROCEDURES

A. EXTERNAL MEASUREMENTS

1. Ground Monitors

On the day of the event, nine monitors were standing by at the locations listed in Table 1.

Additionally, one PHS staff member was at the Amchitka control point and three PHS personnel were airborne in the Amchitka area. A PHS Medical Officer was stationed on a U. S. Coast Guard cutter which was patrolling in the vicinity of Amchitka Island.

Each monitor was equipped with an Eberline E-500B survey instrument and a Victoreen Radector Model AGB-50B-SR.

The Eberline E-500B has a range of 0 to 200 milliroentgens per hour (mR/hr) gamma and beta-gamma detection in four scales with an external halogen filled GM tube and a 0 to 2000 mR/hr gamma only range from an internal Anton 302 tube.

The Radector has a range of 0.05 to 50,000 mR/hr gamma and beta-gamma on two scales. This instrument employs an inert gas ionization chamber. Errors associated with readings from these instruments are on the order of $\pm$20%.

Table 1. Ground monitor locations, Project Longshot.

Location	Number of People
Adak Island	1
Shemya Island	1
St. Paul Island	1
Anchorage, Alaska	6

2. Aerial Cloud Tracking

Aerial cloud tracking was performed by a USAF C-54 aircraft and crew with a three man PHS monitoring team.

Instrumentation for monitoring included two Precision Model 111 Standard "Scintillators", two Eberline E-500B's and two Victoreen Radectors. The probe of one of the Eberline instruments was mounted in the hole below the cabin compartment in such a way that there was only one layer of airplane "skin" below it. The other instruments were mounted inside the cabin of the aircraft.

In addition to the survey instruments, a multichannel pulse height analyzer was installed in the forward portion of the cargo compartment. This system included a multiscaler read-out on a strip chart and a single channel analyzer with a scaler read-out. The detector used was a 3- by 3-inch NaI(Tl) crystal with a 3-inch photomultiplier tube.

3. Film Badges and Dosimeters

On the day of the event, sixteen EG&G thermoluminescent dosimeters (TLD) and 25 DuPont 555 film badges were placed at three film badge stations or worn by ten PHS personnel. (See Table 2)

The DuPont type 555 film is accurate to $\pm$50% in the 30 to 100 mR range and $\pm$10% in the 100 to 2000 mR range. The lower limit of detectability is 30 mR.

The EG&G Model 2 Thermoluminescent Dosimeter System is a wide range gamma dosimeter system consisting of the dosimeters, and EG&G-designed electronic reader, and a light standard for system calibration. The dosimeter exposure is read out and automatically recorded as a permanent chart record.

The TLD System is based on the thermoluminescent properties of manganese-activated calcium fluoride. A layer of this material is bonded to a helical heater element which is positioned in an evacuated glass envelope. The active material "stores" a small amount of the incident radiation by trapping electrons in the high energy levels. The stored energy is released by heating the active material. The released energy, in the form of light energy, corresponds to the dose received and is converted into an electrical signal for the chart recorder output record.

Manufacturer's specifications for this system are as follows:

Range	5 mR - 5000 R
Energy Independence	±10% from 60 Kev to 1.3 Mev
Accuracy	±2 mR or 15% of scale reading, whichever is greater
Output	Graph on perforated 6 inch strip chart recorder

Table 2. Dosimeter and film badge locations.

Location	Total No. of Badges	Total Number of Dosimeters	No. at Film Badge Station		Number Worn by Personnel	
			Badges	TLD	Badges	TLD
Adak	7	2	5	0	2	2
Shemya	6	4	5	3	1	1
St. Paul	6	4	5	3	1	1
Anchorage	6	6	0	0	6	6

B. ENVIRONMENTAL SAMPLING

1. Air Sampling

On the day of the event, 19 Gelman "Tempest" air samplers were operating at locations listed in Table 3 and shown on Figure 1. Also shown in Figure 1 are the permanent sampling stations of the Radiation Surveillance Network administered by the PHS in Washington, D.C.

The "Tempest" air sampler used by the SWRHL employs a Gast Model 1550 vacuum pump driven by a General Electric 1/2 horsepower motor. The pump runs at 1440 rpm and draws an average flow rate of approximately 10 cfm.

The sampler is equipped to use a 4-inch diameter filter paper and an MSA charcoal cartridge. The Air Surveillance Network employs Whatman 541 filter paper for routine air sampling. The total volume of air sampled is calculated from an average vacuum reading (which in turn indicates the average flow rate) and the total time of sampling.

All air sample prefilters and charcoal cartridges were returned to the Southwestern Radiological Health Laboratory in Las Vegas for radiological analyses. Prefilters were counted for gross beta activity in a Beckman "Wide Beta" low background (6 ± 1 cpm beta) proportional system which has an efficiency of approximately 45% for 0.54 Mev betas. After an initial count, if no significant activity was detected, the prefilters were counted at 5 and 12 days after collection.

All charcoal cartridges were analyzed for gross gamma only, and the results compared with normal background cartridges collected at Las Vegas.

Table 3. Air sampler locations and operating periods.

Days Operating	Adak	Anchorage	Bethel	Cold Bay	Cordova	Dillingham	Dutch Harbor	Homer	Ketchikan	Nome	Palmer	Petersburg	Port Heiden	Seward	Shemya	Sitka	St. Paul	Umnak	Yakutat
10/18		X					X				X								
19		X		X			X	X			X							X	
20	X	X		X			X	X	X		X	X		X				X	
21	X	X		X		X	X	X	X	X	X	X		X		X		X	
22	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X	X
23	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X
24	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X
25	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
26	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
27	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
28	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
29	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	SHOT DAY - OCTOBER 29, 1965																		
30		X	X	X	X	X	X	X		X	X	X	X	X		X	X	X	X
31		X	X	X	X	X		X		X	X		X	X		X			
11/1			X	X		X		X		X			X	X		X			
2				X		X		X		X				X		X			
3				X				X		X				X		X			
4								X						X					
5								X						X					
6								X						X					
7								X						X					
8								X						X					
9								X						X					

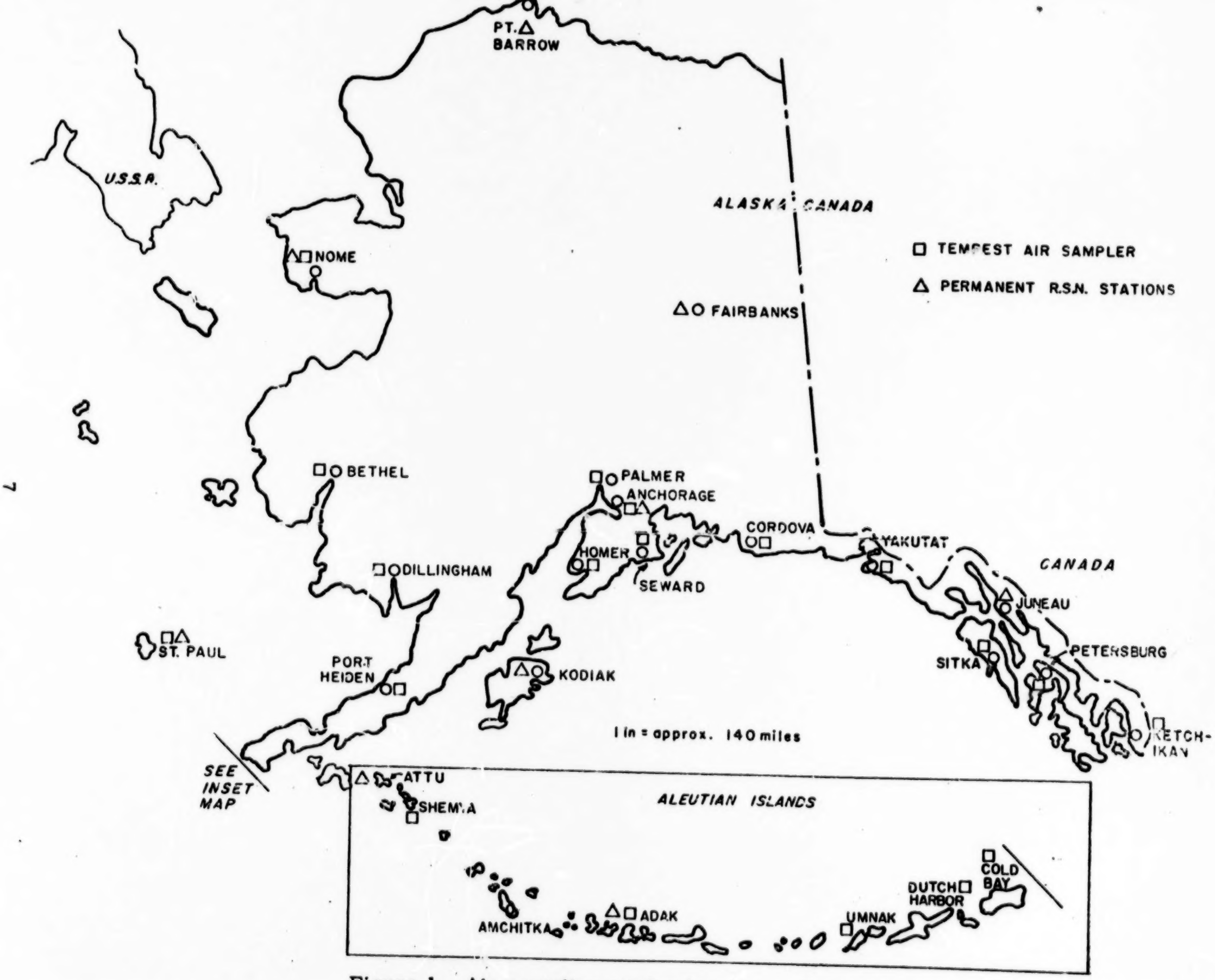

Figure 1. Air sampling station locations, Project Longshot.

2. Milk, Water and Vegetation Samples

No milk, water or vegetation samples were collected specifically for this event.

II. PUBLIC RELATIONS

An extensive public relations program was carried out in the two weeks prior to Project Longshot.

Off-site personnel made appearances before civic groups, and movie exhibitions and informal discussions were conducted on mainland Alaska. In addition, closed circuit television interviews were held at military installations on several of the Aleutian Islands.

III. RESULTS

All radioactivity was completely contained during Project Longshot. No prefilters or charcoal cartridges showed any values above background levels. All TLD's were within background ranges, and all the film badges processed showed no exposures above the limits of detectability.

IV. CONCLUSIONS

Project Longshot produced no radioactive exposure to any off-site resident.